

## LCQ14: LPG light buses

Following is a question by the Hon Jeremy Tam and a written reply by the Secretary for the Environment, Mr Wong Kam-sing, in the Legislative Council today (May 15):

Question:

It has been reported that liquefied petroleum gas (LPG) light buses currently produced by a single manufacturer will cease to be produced in 2021. Thereafter, members of the trade who wish to replace their existing light buses may need to purchase diesel ones. Some environmental groups have pointed out that diesel light buses have a higher level of emission of air pollutants (e.g. respirable suspended particulates) than LPG light buses, posing hazards to public health. In this connection, will the Government inform this Council:

(1) how do the levels of emission of various types of air pollutants (including (i) nitrogen oxides, (ii) respirable suspended particulates, (iii) fine suspended particulates, (iv) hydrocarbons and (v) carbon monoxide) from LPG light buses compare with those from diesel light buses, assuming that both meet the latest emission standards (provide the data on these two types of vehicles obtained respectively in laboratory and from detection on the road by using roadside remote sensing equipment);

(2) of the number of light buses acquired with the subsidy of the Pilot Green Transport Fund (the Fund) since the establishment of the Fund in 2011, and the following information in respect of each of the light buses: (i) the type of energy used, (ii) model, (iii) price, (iv) the amount of subsidy, (v) the route serviced, (vi) the name of operator, (vii) performance (including the time a light bus can travel after a full charge, horsepower and average fuel economy), and (viii) the levels of emissions of various types of air pollutants;

(3) whether it has studied if the light buses mentioned in (2) are better than diesel and LPG light buses in terms of performance and reduction of pollutant emissions; if it has studied and the outcome is in the affirmative, whether the Government will raise the amount of subsidies provided under the Fund to encourage the trade to acquire light buses fuelled by those types of energy; and

(4) as it has been reported that the land leases of the 12 dedicated LPG filling station sites in Hong Kong will expire between 2021 and 2022, whether the Government has plans, in granting renewal of the land leases concerned, to add a provision requiring the lessees to provide charging equipment for electric light buses at the stations?

Reply:

President,

The Government launched a scheme in 2002 to encourage owners of diesel light buses to switch to light buses running on cleaner power/fuels like liquefied petroleum gas (LPG) and electricity. The scheme on an encouraged basis ended in 2005. As the Government has not mandated the type of power/fuels used by light buses, light bus owners may, based on their operational needs, choose LPG, diesel, electric or petrol vehicles. As at the end of 2018, nearly 60 per cent of registered light buses were fuelled by LPG, the remaining 40 per cent by diesel, and less than 1 per cent electric.

At present, the LPG light buses in the local market come from the same brand. The supplier indicated earlier that its manufacturer will cease the production of LPG light buses by the end of 2020, and the Euro VI diesel light buses under the same brand will be supplied by then to meet the local demand for light buses. Owing to technology advancement in emission reduction in recent years, Euro VI diesel light buses emit 80 per cent less nitrogen oxides (NOx) and 50 per cent less respirable suspended particulates (RSP) than their Euro V diesel counterparts and nearly 90 per cent less NOx and 50 per cent less RSP than their Euro IV diesel counterparts.

My specific responses to the question raised by the Hon Jeremy Tam are as follows:

(1) For light buses of design weight more than 3.5 tonnes that have obtained exhaust emission type approval from the Environmental Protection Department (EPD) certifying their compliance with Euro V standards (or equivalent) or Euro VI standards, their laboratory-tested exhaust emission values are tabulated at Annex 1.

Annex 1 shows that advancement in emission reduction technology for Euro VI diesel light buses has largely reduced their NOx and RSP emissions as compared with their Euro V diesel counterparts and even more so as compared with their old Euro IV diesel counterparts. Annex 1 also reveals a significant reduction in the gap between Euro VI diesel light buses and existing LPG light buses in terms of NOx emissions while the emissions from LPG light buses which have been used for years will increase with time. Therefore, when the existing old light buses switch to Euro VI diesel light buses in the future, their overall emission performance will not deteriorate.

Regarding roadside remote sensing equipment, the existing technology is used for monitoring in-use petrol or LPG vehicles that have excessive exhaust emissions but it is not yet applicable to diesel vehicles. Owing to the differences in road conditions, the emission data collected from general vehicles running on road is also technically not suitable for comparison with pollutant emissions collected from laboratory testing (note).

(2) & (3) Currently, there are only two electric light bus models and one hybrid light bus model available in the local market. All have been/are on trial under the Pilot Green Transport Fund (PGTF) and their details are set out at Annex 2.

To avoid hindering approved applicants from receiving competitive tenders, we do not disclose the product price and subsidy amount for

individually approved case.

### Electric Light Buses

Electric light buses (e-LBs) have no tailpipe emissions. Results of existing trials have reflected that high production cost, limited service life and long charging time of batteries, hilly terrain in Hong Kong and the need to provide long hours of air-conditioning during driving in summer, etc. are the key constraints for electric commercial vehicles (e-CVs), including e-LBs, to become popular as the aforesaid factors reduce the driving range of e-CVs batteries. Although the fuel cost of e-LBs on trial under the PGTF is about 70 per cent lower than that of diesel light buses, e-LBs, after a full charge taking four hours, still has a driving range lower than the daily mileage of a typical public light bus (PLB). Therefore, most of the existing e-LBs on trial are yet to be able to cope with the requirements of the local transport sector in respect of requirements on the driving range and charging time of PLBs.

In this connection, the EPD has engaged a consultant to develop a set of technical specifications and requirements of electric public light buses (e-PLB) and its charging facilities suitable for use in Hong Kong in order to help promote suppliers to design and manufacture suitable e-PLBs and charging facilities for local use.

### Hybrid Light Buses

Hybrid vehicles could operate without charging their batteries by an external power source and their operation is similar to that of general conventional vehicles. Higher fuel economy is the merit of hybrid vehicles over their conventional counterparts, thereby reducing operating cost and air pollutant emissions. However, the actual fuel economy of a hybrid vehicle depends on the route in operation. A route requiring frequent start-stop will harness better the hybrid drive-train. If a route is dominated by highway driving, a hybrid vehicle may not outperform its conventional counterpart in fuel economy.

Under the PGTF, five diesel-electric hybrid light buses of the same model (i.e. EQ6700L5SHEVY) have been on trial by applicants who also use conventional diesel light buses. The trial results showed that these hybrid light buses incurred a fuel cost saving of no more than 4 per cent compared to conventional diesel light buses. The lower than anticipated fuel economy of these hybrid light buses might be due to inadequate cooling for their batteries. The manufacturer of this hybrid light bus model has launched a new model of diesel-electric hybrid light buses (i.e. GM6700GAREEV) to replace the old model, and they are on trial under the PGTF by applicants who also use conventional LPG light buses. An independent third party consultant has been engaged by the EPD to assess the trial data of the new model and the results of the trial will be announced upon completion of the assessment.

As regards the NO<sub>x</sub> and RSP emission levels of hybrid light buses, their laboratory-tested exhaust emission values are comparable to those of Euro V diesel light buses.

In addition, The Chief Executive's 2018 Policy Address has announced that the PGTF will be subject to review. The Government is conducting the review and aims to complete it in 2019. After drawing up relevant proposals, the Government will consult the transport sectors, stakeholders, the Advisory Council on the Environment and the Panel on Environmental Affairs of the Legislative Council.

(4) The Design, Build and Operate (DBO) contracts of the 12 dedicated LPG filling stations will expire successively between 2021 and 2022. Prior to the expiry of these DBO contracts, the Government will examine the future arrangements for the dedicated LPG filling stations and, in parallel, consider land uses that will dovetail with the development of new energy vehicles.

Note: For laboratory-based tests, vehicle engines are run under specified conditions for tens of minutes during which their average pollutant emissions are measured. For roadside remote sensing equipment, measurements are made within just a few seconds when vehicles pass by the equipment to identify those with excessive exhaust emissions. Thus, the data collected by the two methods should not be directly compared.